

Claims

1. A waste heat energy recovery method comprising steps of:
  - using a low-boiling medium to absorb waste heat energy from hydraulic oil that has increased in temperature as a result of loss of energy in a hydraulic circuit that includes a pump adapted to be driven by an engine, as well as waste heat energy from another that has increased in temperature as a result of operation of said engine,
  - rotating a power recovery turbine by utilizing the low-boiling medium that has vaporized as a result of absorbing the heat; and
  - boosting power of said engine by means of said turbine.
2. A waste heat energy recovery system comprising:
  - an oil cooler for cooling hydraulic oil that has increased in temperature as a result of loss of energy in a hydraulic circuit that includes a pump adapted to be driven by an engine;
  - another cooling means for cooling another fluid that has increased in temperature as a result of operation of said engine;
  - a turbine for recovering driving power, said turbine provided for said engine and adapted to be rotated by energy provided by a vaporized low-boiling medium; and
  - a low-boiling medium circuit serves to drive said turbine by providing said turbine with the low-boiling medium that has

been vaporized by waste heat energy from the oil cooler and the aforementioned other cooling means.

3. A waste heat energy recovery system as claimed in claim 2, wherein:

    said other cooling means is a radiator for cooling engine cooling water that has increased in temperature as a result of cooling said engine.

4. A waste heat energy recovery system as claimed in claim 2, wherein:

    said other cooling means is an intake air cooler for cooling engine intake air that has increased in temperature as a result of being compressed by a turbocharger.

5. A waste heat energy recovery system comprising:

    an oil cooler for cooling hydraulic oil that has increased in temperature as a result of loss of energy in a hydraulic circuit that includes a pump adapted to be driven by an engine;

    a radiator for cooling engine cooling water that has increased in temperature as a result of cooling said engine;

    an intake air cooler for cooling engine intake air that has increased in temperature as a result of being compressed by a turbocharger;

    a turbine for recovering driving power, said turbine provided for said engine and adapted to be rotated by energy provided by a vaporized low-boiling medium.

6. A waste heat energy recovery system as claimed in any one of the claims from claim 2 to claim 5, wherein said a low-boiling medium circuit comprises:

heat pipes that permit a part of the low-boiling medium that is fed from a low-boiling medium pump to an evaporator of an air conditioning device circuit to branch off from said air conditioning device circuit and pass through said oil cooler and said other cooling means so that said low-boiling medium vaporizes by absorbing heat from said oil cooler and said other cooling means, said air conditioning device circuit comprising a compressor, a condenser, a receiver, said low-boiling medium pump, an expansion valve, and said evaporator, all of which are installed in a construction machine and connected to one another in an endless circuit;

a feed line serving to provide said turbine with the low-boiling medium that has been vaporized inside said heat pipes; and

return line serving to recirculate the low-boiling medium from said turbine to the intake end of said compressor of said air conditioning device circuit.

7. A waste heat energy recovery system as claimed in any one of the claims from claim 2 to claim 6, wherein:

said turbine is connected to a power transmission system that branches off from a power transmission unit that enables

the engine to drive the pump.